

BAB VIII

PERENCANAAN BASE PLATE K3

8.1 Perhitungan Jumlah Baut Angker Kolom K3

Output Gaya Maksimum pada Sambungan hasil SAP

$$M_u := 9402.48 \text{ kgm}$$

$$P_u := 26454.37 \text{ kg}$$

Direncanakan baut HTB $\phi 19$ BJ 41

$$f_{ub} := 4100 \text{ kg/cm}^2$$

$$\Phi_{\text{baut}} := 19 \text{ mm}$$

$$A_b := \frac{\pi}{4} \cdot 1.9^2 = 2.84 \text{ cm}^2$$

Pelat penyambung BJ 37

$$f_u := 3700 \text{ kg/cm}^2 \quad t_p := 12 \text{ mm}$$

$$f_y := 2400 \text{ kg/cm}^2$$

- Kontrol Geser

Direncanakan baut HTB 6 $\phi 19$

$$V_u := \frac{P_u}{6} = 4409.062 \text{ kg}$$

$$f_{uv} := \frac{V_u}{A_b} = 1449.26 \text{ kg/cm}^2 \quad \leq \quad 0.5 \cdot 0.75 \cdot f_{ub} \cdot 1 = 1537.5 \text{ kg/cm}^2 \quad \text{OK!!}$$

- Beban Tarik (interaksi geser dan tarik)

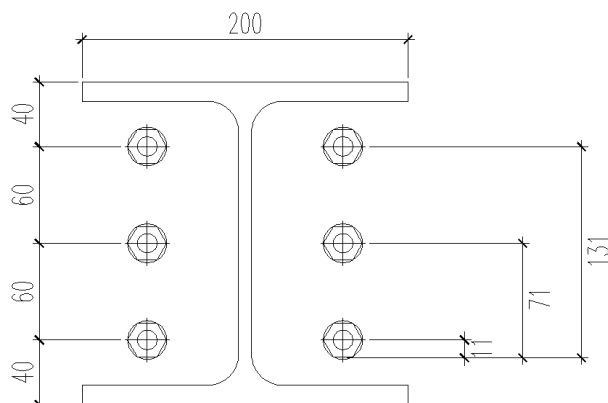
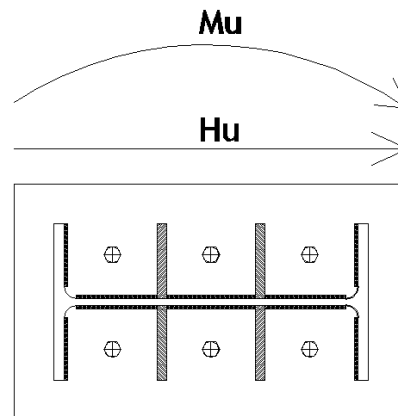
$$f_t := (1.3 \cdot f_{ub} - 1.2 \cdot f_{uv}) = 3590.891 \text{ kg/cm}^2 \quad \leq \quad f_{ub} = 4100 \text{ kg/cm}^2$$

$$f_t := f_{ub} = 4100 \text{ kg/cm}^2$$

$$T_d := 0.75 \cdot f_{ub} \cdot A_b = 8718.509 \text{ kg}$$

Mencari garis netral ----> anggap dibawah baut terbawah

$$a := \frac{6 \cdot T_d}{20 \cdot 2400} = 1.09 \text{ cm} \quad \leq \quad 4 \text{ cm} \quad \text{OK!!}$$



Momen rencana yang dapat dipikul sambungan

$$\Phi M_n := \frac{\left[\left(0.9 \cdot 2400 \cdot a^2 \cdot \frac{20}{2} \right) + 2 \cdot T_d \cdot (1.1 + 7.1 + 13.1) \right]}{100} = 11030.523 \text{ kgm}$$

$$\Phi M_n = 11030.52 \text{ kgm} \quad \Phi \geq \Phi \quad M_u = 9402.48 \text{ kgm}$$

8.2 Panjang Angker

$$T_u := \frac{M_u}{2 \cdot (0.011 + 0.071 + 0.131)} = 22071.55 \text{ kg}$$

$$\sigma_b := 225 \text{ kg/cm}^2 \quad (\text{Tegangan beton})$$

$$L_d := \frac{T_u}{0.9 \pi \cdot 1.9 \cdot \sqrt{\sigma_b}} = 39.302 \text{ cm} \quad \Phi < \Phi \quad L_{min} := 30 \cdot \Phi_{baut} \cdot 0.1 = 57 \text{ cm}$$

Pakai panjang angker 60 cm

8.3 Sambungan Pelat dengan Solid Beam (Sambungan Las)

Digunakan las F_{E70XX}

Tebal las $t_e := 1 \text{ cm}$

Profil H 200 x 200 x 8 x 12 BJ 37

$$h := 200 - 2 \cdot (12 + 13) = 150 \text{ mm}$$

$$A := 2 \cdot (15 + 20) \cdot 1 = 70 \text{ cm}^2$$

$$I_p := 2 \cdot \left[\left(\frac{1}{12} \cdot 15 \right)^3 + \left[1 \cdot 70 \cdot \left(\frac{20}{2} \right)^2 \right] \right] = 14003.906 \text{ cm}^4$$

Akibat beban geser sentris

$$P_u = 26454.37 \text{ kg}$$

$$f_u := \frac{P_u}{A} = 377.92 \text{ kg/cm}^2$$

Akibat beban momen lentur

$$M_u = 9402.48 \text{ kgm}$$

$$S_x := \frac{I_p}{20} = 700.2 \text{ cm}^3$$

$$f_h := \frac{M_u \cdot 100}{S_x} = 1342.84 \frac{\text{kg}}{\text{cm}^2}$$

$$f_{tot} := \sqrt{f_u^2 + f_h^2} = 745.7 \frac{\text{kg}}{\text{cm}^2}$$

Kekuatan rencana las

$$\Phi f_n := (0.75 \cdot 0.6 \cdot 70 \cdot 70.3) = 2214.45 \frac{\text{kg}}{\text{cm}^2}$$

$$f_{total} < \Phi f_n$$

$$t_{perlu} \geq \frac{f_{tot}}{\Phi f_n} = 0.337 \text{ cm}$$

$$a_{perlu} \geq \frac{0.337}{0.707} = 0.477 \text{ cm}$$

Syarat :

$$a_{min} := 5 \text{ mm } (t = 20 \text{ mm})$$

$$a_{effmax} := 0.707 \cdot \frac{3700 \cdot 0.8}{70 \cdot 70.3} = 0.43 \text{ cm } (\text{las di badan})$$

$$a_{effmax} := 1.41 \cdot \frac{3700 \cdot 1.2}{70 \cdot 70.3} = 1.27 \text{ cm } (\text{las di daun})$$

$$\text{maka dipakai } a = 5 \text{ mm} > a_{perlu} = 0.477 \text{ mm}$$

- **Kontrol Pelat Sambung**

Pelat penyambung BJ 37

Direncanakan baut BJ 37

$$f_u := 3700 \text{ kg/cm}^2$$

$$f_{ub} := 3700 \text{ kg/cm}^2$$

$$f_y := 2400 \text{ kg/cm}^2$$

$$d_b := 1.9 \text{ cm}$$

$$t_p := 1.2 \text{ cm}$$

$$A_b := \frac{\pi}{4} \cdot 1.9^2 = 2.84 \text{ cm}^2$$

Luas bidang geser

$$L := 20 \text{ cm}$$

$$A_{nv} := (L - 3 \cdot d_b) \cdot t_p = 17.16 \text{ cm}^2$$

Kuat Rencana

$$\Phi P_n := 0.75 \cdot (0.6 \cdot f_u \cdot A_{nv}) = 28571.4 \text{ kg} \quad \blacksquare > \blacksquare \quad P_u = 26454.37 \text{ kg}$$